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Military Operations

**Army Aviation Warfighting Concept of Operation**

**Summary.** This pamphlet serves as the basis for developing doctrine, training, leader development, organizations, materiel, and soldier (DTLOMS) changes focused on requirements and solutions for army aviation operations. It provides the framework to describe the capabilities required for army aviation Army.

**Applicability.** This pamphlet applies to all Army aviation organizations and U.S. Army Training and Doctrine Command (TRADOC) activities that develop DTLOMS requirements.

**Suggested improvements.** The proponent for this pamphlet is the Deputy Chief of Staff for Combat Developments. Forward comments and suggested changes or improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to Commander, TRADOC, ATTN: ATCD-BP, Fort Monroe, Virginia 23651-5000. Suggested improvements may also be submitted using DA Form 1045 (Army Ideas for Excellence Program (AIEP) Proposal). E-mail submissions may be sent to atcdbp@monroe.army.mil.

**Availability.** This publication is available at <http://www-tradoc.army.mil> on the TRADOC Homepage.

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**Chapter 1**

**Introduction**

**1-1. Purpose.**

a. The Army Aviation Warfighting Concept of Operation describes how Army aviation will contribute to Force XXI Operations and fight as a member of the Army's combined arms team in joint and multinational operations. It focuses on Army aviation's contributions to situational awareness through reconnaissance and security operations, precision engagements, and its ability to rapidly react throughout the spectrum of operations.

b. Vision. "We will continue to provide the force highly motivated aviation soldiers and leaders equipped with modern systems and trained to world

class proficiency, operating in organizations that are inherently versatile, with maneuver advantage, and warfighting effectiveness that will influence all dimensions of the current and future Army XXI Battle space."

c. Aviation's strength remains in its ability to deploy quickly, conduct reconnaissance and security, maneuver rapidly, and focus tremendous combat power for the land component joint force commander. Army aviation gives the land component joint force commanders unique capabilities which enhance their force's overall effectiveness.

**1-2. References.**

a. TRADOC Pam 71-9, Requirements Determination.

- b. TRADOC Pam 525-5, Force XXI Operations.
- c. TRADOC Pam 525-60, Operational Concept for Space Support to Land Force Operations.
- d. TRADOC Pam 525-68, Concept for Modularity.
- e. TRADOC Pam 525-69, Concept for Information Operations.
- f. TRADOC Pam 525-72, Army Airspace Command and Control (A2C2).
- g. USAAVNC Pam 525-5, Aviation in Force XXI Operations.
- h. TRADOC Requirements Determination, Black Book #3.

### 1-3. Explanation of abbreviations and terms.

Abbreviations used in this pamphlet are explained in the glossary.

## Chapter 2 Overview

**2-1. Why the concept is needed.** The Aviation Operations Concept is needed to provide the linkage and integration of TRADOC Pam 525-5, Force XXI Operations, our overarching concept, and other approved operations concepts into aviation Future Operational Capability (FOC) determination. This will set the conditions for Army aviation to continue the mission towards Army After Next.

### 2-2. Threat.

a. We must continue to focus on winning our nation's wars to include major theater of wars. The range of military operations and regional threats are less defined than in former times, but we see potential adversaries arming themselves with better equipment that employs technologies which can defeat our helicopter employment capability. Many of these adversaries may possess the latest technology in armor, fighting vehicles, air defense, attack helicopters, missiles, and artillery. The mix could well include systems manufactured by the United States (U.S.) and our allies.

b. The implications for aviation units facing these threat forces from both the geographical and technological aspects of the environment are:

(1) Deployments occurring on short notice will be the standard rather than the exception.

(2) Aviation units must be able to self deploy long distances and be able to fight, if required, upon reaching the theater.

(3) Operations will probably occur on an extended battlefield.

(4) A serious challenge to U.S. military superiority on the future battlefield will come from the proliferation of advanced weapons, many of them designed to take away our advantage in helicopter supported operations, such as our capability to conduct deep helicopter operations.

## Chapter 3 Concept

**3-1. Overview.** Army aviation will act as part of a joint, combined, or multinational force in future operations. Aviation's ability to operate in all dimensions of the battlespace is a dominant force multiplier. Aviation's flexibility and agility will be essential to the Joint Force Commander as he works to gain situational awareness, protect his deploying force, and strike the enemy throughout the width and depth of the battle space.

### 3-2. Concept descriptions.

a. Aviation brings to Force XXI Operations a variety of capabilities that enhance the battlefield dynamic processes which enable full dimensional operations. The general patterns of operations (figure 3-1) consistent with Force XXI requirements, will be to project the force, protect the force, gain information dominance, shape the battlespace, conduct decisive operations, and sustain the force. Army aviation has direct contributions to each pattern of operation and possesses the capability to conduct one or more of the patterns simultaneously.

(1) Project the force. Aviation through rapid or self-deployment of air movement, air assault, attack, and command and control assets will directly impact force projection, especially in early entry operations. Early entry operations will be conducted by forces that are not necessarily heavy or light, but tailored to mission, enemy, terrain, troops, time available, and civilian considerations (METT-TC) in order to create the best possible capabilities-based force to meet the needs of any contingency. We see all future commanders taking aviation early in the deployment to function in each of the future patterns of operations.

(2) Protect the force. Aviation provides both active and passive capabilities to the force through armed reconnaissance, security, air-to-air combat, suppression of enemy air defense, and medical evacuation. Its speed and agility promote survivability to all elements of the force. If ground lines of communication (LOC) extend for unusually long distances, or are overly hampered by terrain, Army aviation may be the primary means for the land component commander (LCC) to keep the pressure on the enemy throughout the battlespace.

(a) Once projected into the theater of operations, aviation forces may be required to conduct operations which support force protection. Armed reconnaissance aircraft will conduct security operations for the main body and act in an economy of force role. Attack and assault helicopter units conduct missions to deter or defeat enemy forces to provide additional time for the deployment of follow on forces. Aeromedical evacuation helicopters will provide the primary means of evacuating seriously wounded casualties until ground LOCs can be established.

(b) Reconnaissance and security operations will include both ground and air counter-reconnaissance activities. Aviation can significantly increase the effectiveness of counter-reconnaissance operations. Aviation forces not only increase the distance from the main body at which the joint task force (JTF) commander can conduct counter-reconnaissance operations, but also provide the capability to conduct anti-personnel, anti-armor, and air combat operations. Aviation conducts reconnaissance and counter-reconnaissance operations in combination with intelligence operations to answer the commander's critical information requirements (CCIR). By increasing the distance from the main body that the security force operates, and by denying the enemy information about our forces, we greatly reduce the possibility that the main body will be surprised by enemy action. Sensors will acquire targets and attack systems will engage them. Army aviation attack and reconnaissance units will do both, out to ranges in excess of 200 kilometers.

(c) Attack helicopter assets will be a major contributor to force protection during the early phase of a forcible entry operation. Self deployed or airlifted attack helicopters will be the LCCs most responsive force to defend against ground attack or go after theater missiles to protect the force.

(d) Air assault operations will be a valuable asset to be used as a rapid reaction force to bolster local force protection early in rear operations. During sustainment operations traditional air assault operations will help bring the conflict to closure. Air insertions of distant observation posts and surveillance teams will support target acquisition and decision making, giving the commander the information he needs.

(3) Gain information dominance. Army aviation provides tactical reconnaissance; mobile command, control, communications, and intelligence; and intelligence/electronic warfare to enable the force to gain greater maneuver, firepower, and protection for the force. Future air vehicles with their stealth and on-board automated sensor processing capabilities feeding the ATCCS system, will be the commander's "weapon of choice" to fill the void in information gathered from the integrated, joint and national reconnaissance systems.

(4) Shape the battlespace. Shaping the battlespace is achieved through simultaneous, precision attacks throughout the depth of the battlespace to establish the conditions for decisive operations. Aviation provides dynamic capabilities through attack operations, reconnaissance, and air assault operations. Aviation may conduct hasty and deliberate attacks simultaneously and in depth throughout the battlespace. Army aviation will accomplish these tasks as a member of the combined arms team taking advantage of all other sources of enemy information and the application of supporting fires, both precision and non-precision.

(a) Heliborne command posts at brigade, division, corps, and echelons above corps will give a commander at any level the ability to digitally command and control his assets out to extended ranges, as well as the ability to rapidly reposition himself as the situation develops. Battlespace is only limited by a commander's ability to acquire and engage the enemy. Army aviation expands the ground commander's battlespace well beyond the effective range of ground maneuver forces at every echelon. Cavalry and attack helicopter units must expand that battlespace by hundreds of kilometers through deep attack and reconnaissance operations. Deep air assault operations can also be conducted to establish forward operating bases and refuel/rearm points in support of the deep attacks. In these ways, Army aviation not only shapes the battlespace, it will define it.

(b) Army aviation will project combat power beyond ground forces to impair an adversary's freedom of operations and/or inflict casualties. Future aircraft will acquire and laser designate targets hundreds of kilometers beyond the forward line of troops (FLOT) and will enable precision attacks from other sources. This will give the LCC several methods to place precision fires anywhere in his battlespace. Army helicopters can also operate off naval ships, greatly extending the commander's battlespace and employment options in coastal areas. Throughout the battlespace shaping phase, deep attack operations will be launched to destroy priority targets. These missions will have the collateral impact of providing the commander critical, real-time intelligence and battle damage assessment information. At the division level, Army aviation will provide the most responsive and versatile means of providing accurate and responsive long range artillery, attack helicopter, or "eyes on" close air support attacks.

(5) Conduct decisive operations. Aviation's ability to strike deep and provide enhanced targeting information is essential to the success of decisive operations. Aviation has an active role in theater missile defense and the conduct of special operations in support of the force committed to decisive operations.

(a) Army aviation provides the commander with real-time intelligence throughout his battlespace with its attack and reconnaissance aircraft. Decisive operations do not require the presence of overwhelming forces, simply the ability to mass overwhelming firepower and other effects at the point where the enemy is most vulnerable. Army aviation gives the commander the ability to see that point and maneuver his forces to strike it.

(b) Army aviation's mobility and firepower make it a dominant force, a force that can gain, maintain contact, and destroy the enemy in depth, allowing him no safe haven in which to reorganize, rearm, or recover. Attack and reconnaissance helicopter units give the commander a force that can rapidly build devastating firepower at any point on the battlefield.

(c) During the decisive phase, force protection is just as critical as when the commander is shaping the battlefield. Aviation reconnaissance and attack aircraft will conduct security operations for the friendly force providing protection from enemy counter-attacks. Utility and medium lift units can assist in breaching an obstacle or forming a crossing site by moving engineer and security forces into position rapidly. Medium lift aircraft can rapidly move Class IV materials to assist ground forces with survivability operations.

(6) Sustain the force. Sustainment is a continuous process in which aviation plays a significant role in Force XXI operations. Aviation's ability to rapidly self-deploy, conduct intra-theater air movement of critical supplies, and provide aerial resupply to forward deployed troops and/or widely dispersed forces are of prime importance to the force. Additionally, aviation provides aerial recovery/evacuation capabilities to move personnel and equipment, thereby ensuring asset availability and shortened down-time on equipment.

b. Aviation's enhancement to Force XXI characteristics.

(1) Doctrinal flexibility. Having the means for day/night and adverse weather reconnaissance and security at some distance from a lodgment area is crucial in early entry operations. Aerial reconnaissance or air cavalry assets can monitor enemy forces and act in an economy of force role. Attack and assault helicopter units are a strong deterrent force and thus provide more time to deploying forces. In case of open hostilities, aviation assets available in the theater early will provide the commander one of his most lethal, flexible, and versatile means of destroying enemy forces. Self-deployed or airlifted combat aviation forces are a potentially decisive means of holding off strong attacking forces until strategic deployment of heavy ground formations can be executed.

(2) Strategic mobility. Aviation's high degree of battlespace mobility greatly increases the probability that aviation units will be at the right place, at the right time, and with the right capabilities required to meet the commander's objectives. Aviation's strength is its versatility to deploy quickly, see the battlefield, maneuver rapidly, and focus tremendous combat power (such as artillery and Air Force assets) at decisive points. Aviation provides a responsive and sustainable combat force to meet strategic mobility requirements through self deployability or air transportability.

(3) Tailorability and modularity. Aviation will be able to obtain the operational interface capability to operate effectively within the joint, multinational, and interagency imposed operations. Advanced information age technologies that are modular, fully compatible and fully interoperable will provide, through horizontal technology insertions, aviation systems that are capable of achieving Force XXI objectives.

(4) Versatility in war and Stability and Support Operations (SASO). The Army's primary focus is to fight and win the nation's wars, yet operate daily around the world in an environment that may not involve combat operations against enemy military forces. These other operations support national policy objectives and are included in the national military strategy. Such operations are designed to promote regional stability, maintain or achieve democratic end-states, retain U.S. influence and access abroad, provide humanitarian assistance to distressed areas, protect U.S. interests, and assist U.S. civil authorities.

(a) SASO may not always have peaceful results. Several of the activities employing aviation forces will be conducted in the presence of hostile threat forces and may result in combat either by design or by the reaction of those threat forces. In these operations, it is essential to apply appropriate military capability prudently. Aviation assets are committed to the disciplined application of force in accordance with specified rules of engagement. The presence of attack and reconnaissance helicopters on a SASO provides the commander force protection, rapid response to threats, and verification of treaty accords. Here the "weapon of choice" may well be an attack helicopter gun camera and the visual effects this type aircraft have on the former warring factions, setting the tone to maintain the peace.

(b) Combating terrorism. There are two major subcomponents to combating terrorism: antiterrorism and counter-terrorism. During peacetime, the Army combats terrorism primarily through antiterrorism passive defensive measures taken to minimize vulnerability to terrorism. Antiterrorism is a form of force protection and is therefore the responsibility of

aviation unit commanders at all levels. Counter-terrorism is the full range of offensive measures taken to prevent, deter, and respond to terrorism. Army aviation may conduct counter-terrorism operations in the following type operations.

(c) **Peace enforcement.** These operations involve the application of military force or the threat of its use, normally pursuant to international authorization, to compel compliance with generally accepted resolutions or sanctions. The purpose of peace operations is to maintain or restore peace and support diplomatic efforts to reach a long-term political settlement. Combat aviation units which can be deployed into the area of operations with early entry ground forces can have a significant deterrent effect on the indigenous combatants, particularly if these factions have armored forces. Air cavalry units may be employed to conduct reconnaissance and surveillance. Medium lift helicopter units will be employed to move military and civil peace enforcement personnel or to deliver relief supplies when warring factions interdict surface transportation or routes become impassable.

(d) **Peacekeeping and humanitarian assistance.** Peacekeeping operations support diplomatic efforts to maintain peace in areas of potential conflict. As with peace enforcement operations, aviation units and soldiers engaged in peacekeeping must apply restraint, have patience and maintain a heightened security awareness in executing these missions. Peacekeeping forces deter violent acts by their physical presence at violence-prone locations. Humanitarian assistance operations provide emergency relief to victims of natural or man-made disasters when initiated in response to domestic, foreign government, or international agency requests for immediate help and rehabilitation. Disaster relief operations include refugee assistance, food programs, medical treatment and care, restoration of law and order, damage and capabilities assessment, and damage control.

(e) **Nation assistance.** Nation assistance operations are conducted in support of a host nation's efforts to promote self-development. Aviation's participation in nation assistance will normally be limited to the use of individual soldiers and teams to train and educate local officials. The use of liaison aircraft to assist in overcoming terrain obstacles and limited road nets will extend and enhance a nation state's LOC.

(f) **Security assistance.** Security assistance programs are the means by which the United States provides defense materiel, military training, and defense related services by grant, loan, credit, or cash sales to further national policies and objectives. The main interface of the U.S. Army with host nations occurs through the Security Assistance Training Program, which has two primary sub-components, the

International Military Education and Training Program (IMETP) and the Foreign Military Sales Program (FMSP).

(g) **Support to Domestic Civil Authorities.** When the appropriate governmental authority directs the armed forces to assist in domestic emergencies within the continental United States (CONUS), the Army has primary responsibility. Aviation units support disaster relief, provide humanitarian assistance, air traffic services and conduct similar operations when directed. The Posse Comitatus Act requires specific presidential or congressional approval and direction before Active Army or U.S. Army Reserve forces may execute the law in place of duly appointed law enforcement officers. The Army National Guard has similar, but less stringent, restrictions. In its capacity as a state militia, the National Guard may employ aviation units to assist state law enforcement officials largely at the discretion of the state government.

### **3-3. Future Operational Capabilities.**

The following are the future operational capabilities required to successfully accomplish Army aviation enhancements to Army XXI.

#### **a. Communications. (FOC AV 97-001)**

**Description:** Capability for across-theater, secure, jam-resistant, air-to-ground, ground-to-air, and air-to-air transmission and receipt of voice and data communications while in nap-of-the-earth (NOE) flight conditions in both line of sight and non-line of sight situations. Data transmission rates must be fast enough to permit rapid hand over of reconnaissance reports, (to include imagery and video) target data files, and similar voluminous messages. The continuous need for situational awareness data, resolution of conflicts in use of ground and air battle space for maneuver and fire, and the tethering of units to their command elements require reliable and continuous connectivity. The system must be compliant and interoperable with Army, joint, combined, coalition, and interagency voice and data message formats and transmission methodology standards. Communication systems performance should degrade gracefully rather than catastrophically when components fail or are damaged. Communication and data/information processing systems must be hardened against electromagnetic environmental effects, compromise, corruption, or degradation by the threat given the anticipated realities of information warfare in the future.

#### **b. Pilotage and Navigation. (FOC AV 97-002)**

**Description:** Capability to conduct on-demand sustained operations 24 hours a day at terrain flight altitudes and higher under obscured and low visibility conditions caused by darkness, weather, and natural

and/or artificial particulate matter in the atmosphere while maintaining situational awareness. Capability to operate with “heads up - eyes out of the cockpit.” Capabilities must comply with the physiological limits of crew members’ tolerance. Capability to precisely determine real time navigational position worldwide to maximize situational awareness for obstacle/terrain avoidance, command and control functions, fratricide prevention, and to positively and effectively interface with the airspace management systems. Position location system must be hardened, jam-resistant, and highly reliable. Situational awareness displays that include cultural features and operational graphics, and that interface with the navigational system to show current location, will be required for enhanced situational awareness.

**c. Mission Planning and Rehearsal.  
(FOC AV 97-003)**

Description: Capability to plan and rehearse aviation missions, and to re-plan when factors change, with minimum time and effort required to set up, enter, and retrieve mission data into and from the aircraft and its subsystems. Planning system must maximize the interface among mission planning systems throughout the fleet, integrate all tactical operation plans, and ensure effective joint, combined, and coalition utilization of airspace. System must support pre-flight and enroute revision of mission planning information. System must be able to communicate readily with and among supporting, supported, and adjacent mission planning systems.

**d. Cognitive Decision Aids/Crew member Associate. (FOC AV 97-004)**

Description: Capability to aid crew members in maintaining total system awareness and in mission management during mission execution. Allow the crew members to operate with their “eyes out of the cockpit” by monitoring internal aircraft status, assisting in communication actions, mission and route re-planning, detection of threat surveillance and tracking systems engagement, warning of missile lock-ons, and activation of countermeasures when authorized.

**e. Aided Target Acquisition and Identification.  
(FOC AV 97-005)**

Description: Capability to detect, recognize, classify, identify through non-cooperative methods, and prioritize both ground and aerial targets at ranges in excess of the threat’s detection and weapon systems effective ranges and inside the threat’s detection and response time. The targeting system must be compatible with fratricide prevention measures to include the Battlefield Combat Identification System and Identification, Friend or Foe systems. The targeting system must perform effectively day or night

in adverse weather, in cluttered background environments, and in the presence of threat countermeasures to include jamming, screening, and camouflage. The system must be capable of providing accurate target location information for reporting or hand over and for receiving targeting data via improved sensor to shooter links. The target acquisition system interface with the weapon systems should minimize the time needed to engage the target. The capability should include utilizing and controlling UAVs as an adjunct system for reconnaissance and targeting.

**f. Weapons Suite. (FOC AV 97-006)**

Description: Capability to rapidly destroy/neutralize a maximum number of threat ground and air systems, to include mobile short dwell-time targets, per mission at maximum range, with minimum expenditure of rounds, minimum engagement times, and with increased reliance on indirect engagement using smart munitions. This capability requires access to improved sensor-to-shooter links combined with a concomitant capability in air-launched, precision, programmable variable range munitions/missiles (some with variable dwell times) to optimize the probability of successful target engagement. When engaging targets in a line of sight mode, the weapon systems should minimize the firing aircraft’s exposure to return fire. The weapon systems must be effective day or night, in high background clutter environments, and under adverse weather and obscured visibility conditions. The weapon systems must be countermeasure resistant. Weapon systems signature must be difficult for the threat to detect. The weapon systems must provide precision engagement of selected targets to minimize collateral damage. The weapon systems must be compatible with fratricide prevention procedures. Weapon system must provide a self-defense capability against close-in, off-axis threats that appear unexpectedly.

**g. Survivability. (FOC AV 97-007)**

Description: Capability to enhance aircraft and aircrew survival including, but not limited to, the following measures:

(1) Passive aircraft survival by avoiding detection by the threat through the balanced use of signature reduction, low observables, and systems capable of providing warning about the total spectrum of ground and air threats. The system must provide early warning outside of the threat systems’ detection and effective engagement ranges. The warning system must not be activated or degraded by the use of the aircraft’s own countermeasure systems.

(2) Active aircraft survival by neutralizing threat detection acquisition, and by countering weapon systems (such as threat air defense systems and threat

air vehicles) through employment of effective active countermeasures or by attacking with fire and forget rapid-reaction weapons at maximum ranges.

(3) Capability to detect and avoid nuclear, biological, chemical (NBC) contamination, and to be rapidly and safely decontaminated if exposed.

(4) Capability to detect and avoid natural and man-made obstacles.

(5) Capability to survive ballistic impact, thermal, and overpressure effects of weapons.

(6) Crash-worthiness capability to protect crew members and passengers from injury in aircraft accidents. Capability to minimize aircraft and systems damage in accidents. The survival capability must function against all threat directed-energy weapons, electro-magnetic pulses, and NBC weapons to the point that the aircraft and crew can continue the mission without significant performance degradation.

#### **h. Aircraft Inter- and Intra-Theater Capability. (FOC AV 97-008)**

Description: Capability to self-deploy worldwide and be rapidly operational with minimal support upon arrival. Capability to be air-transportable with minimal preparation effort. Capability to operate in and from unimproved areas. Capability to conduct shipboard operations. Capability to operate in worldwide conditions of hot, cold, wet, and dry, and to operate in adverse conditions (blowing sand, dust, salt spray, etc.) with minimal aircraft damage or degradation.

#### **i. Improved Aircraft Performance. (FOC AV 97-009)**

Description: Capability to meet mission requirements through enhanced aircraft performance (range, speed, agility, maneuverability, lift, specific fuel consumption, etc.) at terrain heights and higher. Capability to conduct long range and deep penetration missions with reduced fueling requirements. For aircraft performing air assault and utility missions, capability to lift and transport combat, combat support, and combat service support personnel and their associated equipment and supplies in an effective and timely manner to maintain the operational tempo. For aircraft performing cargo and lift missions, capability to lift and transport current and future light infantry fighting vehicles, air defense systems, artillery systems, and engineers' equipment in an effective and timely manner to maintain the operational tempo. Capability for internal cargo transport with rapid loading and unloading with minimum manpower requirements. Capability for external cargo transport with automatic hookup and sling load stabilization. Capability to perform rapid automated logistical movement of medium weight modular payloads utilizing an

unmanned air vehicle capable of being controlled from air, ground, or autonomous mode. This will require a vertical takeoff and landing VTOL, self-deployable, aircraft capable of day/night, all weather operations. Incorporated into the system will be a cargo payload item identification system, cargo payload position location system, and/or heavy lift capability.

#### **j. Aviation Availability and Logistic Supportability. (FOC AV 97-010)**

Description: Capability to sustain a high operational readiness/OPTempo rate with minimal demands on quality and quantity of maintenance manpower. To achieve this goal will require the capability to use diagnostic, prognostic, and expert system techniques to isolate and identify failures and potential failures, and to optimize the scheduling of maintenance actions for maximum reduction of maintenance costs and minimum impact on operational availability. Maintenance requirements must maximize the use of common tools, and test, measurement, and diagnostic equipment TMDE and minimize or eliminate requirements for peculiar or system-unique support equipment. Capability to reconfigure systems in response to component degradation or failure during mission execution so that the mission can be completed rather than aborted. Capability to ensure "around the clock" system availability. Capability to minimize aircraft turn-around time for refueling and rearming during combat operations to maximize OPTempo. To support this, a system of planned logistic support that enables precise delivery of class III and class V supplies to forward battlefield locations is required. The total system must be flexible to effectively bring aircraft and supplies together in a dynamic environment where preplanned refuel and rearm points are not useable. The system must be capable of rapidly refueling multiple aircraft simultaneously. Munitions should be packaged to accommodate rapid rearming.

#### **k. Aviation Battle Command. (FOC AV 97-011)**

Description: Capability to provide commanders and staff with mobile command posts that can operate both on the ground and in the air and when stationary or on the move. System must have maximum interoperability across all Army and joint C2 systems. System must be deployable, air transportable, and have the communications capability to keep the commander electronically tethered to all echelons and provide linkage to combined arms, joint and coalition sources of real time intelligence, fires, tactical air, and combat service support across the battlefield. It should have a tailorable battlefield visualization capability that allows the commander to view his area of operations as a supplement to the common picture of the battlefield and perform the necessary graphic analyses for maneuver and fires such as a detailed

analysis of flight route options. The visualization capability should utilize the common picture of the battlefield along with any other map database or intelligence information necessary to accurately represent the area under consideration in sufficient detail. The command post must be configured to support all required staff functions.

#### **l. Airspace Management. (FOC AV 97-012)**

Description: Capability to effectively manage multiple users of airspace thus minimizing conflicts and maximizing the overall successful mission accomplishment rate. This requires close integration between C2, Army Airspace Command and Control, Army aviation, air defense, artillery, military intelligence, aeromedical support, special operations, airborne and infantry operations, mounted ground operations, sister service and coalition members operations, and possibly civilian airspace management agencies. Also requires communication/automation equipment that is compatible with these organizations and that is compliant with the Army Battle Command System/Common Operating Environment equipment and with required standards. The communications capability should meet the requirements listed previously in AV 97-001: Communications, and in AV 97-011: Aviation Battle Command. The system must be capable of rapid deployment, must be operational while mobile, and must maintain flexibility in response to an ever-changing operational situation. The system must have a real time air picture and real time communications with all airspace-user elements. The system must be able to electronically translate raw airspace data into a useable three-dimensional airspace picture and direct two-way interface into the Contingency Theater Automated Planning System for Army airspace users requiring near real time deconfliction or situational awareness of air assets. In addition to analog and digital communication, the system should support an automated capability to collect, display, and disseminate airspace control measures to all airspace users. The airspace management system must comply with Federal Aviation Administration requirements for peacetime United States operations, and be compatible with all other airspace command and control systems, including existing joint, multinational, and host nation airspace management requirements during joint or coalition exercises outside the United States.

#### **m. Systematic Upgrade of Constructive Combat Development Models. (FOC AV 97-013) (Analysis)**

Description: Capability to effect the upgrade of the TRADOC family of combat development models to adequately portray advanced sensor technology, to incorporate capabilities of aviation platforms to be linked and cued by overhead data collection efforts, and to replicate the countermeasure with which these

platforms are equipped. Without replication of core Force XXI-enabling technologies, wargaming the digital battlefield is inaccurate and will not allow adequate investigation of DTLOMS solutions to Army requirements.

#### **n. Training Aids, Devices, Simulators, and Simulations (TADSS). (FOC AV 97-014) (Training)**

Description: Army Aviation must have the capability to train and sustain individual, leader, and collective warfighting skills. Units must be able to train with these TADSS utilizing a combination of interoperable live, constructive, and virtual simulation. Commanders must have the capability to conduct and assess training and rehearsals, using a variety of TADSS, appropriate for the training audience and the commander's training objectives. Additional capability is required to determine how much fidelity is required for a given simulation, how to maximize training transfer from the simulated to the real world, and how best to balance TADSS fidelity requirements with fiscal constraints (i.e., increased fidelity = increased program costs). The Army must develop and institutionalize design group principles, protocols, and common operating environments for TADSS.

#### **o. Embedded Training (ET). (FOC AV 97-015)**

Description: Embedded training is a capability designed into or added onto hardware/software systems which allow the system to function as a stand-alone system or as part of a collective training system. The needed capability is an ET system(s) which will provide the cues necessary to train individuals, crews, and units in gunnery and maneuver skills; allow the system to participate in force-on-force exercises through embedded tactical engagement simulation and instrumentation and interoperability with ABCS platforms and Combat Training Centers (CTC) instrumentation systems.

#### **p. Virtual Reality (Training). (FOC AV 97-016)**

Description: The Army must seek virtual reality solutions to provide ET capabilities for operators and maintainers of Army aircraft. The Army must have the capability to use advanced simulation as a means of providing cost-effective, safe, realistic, versatile, and accessible training to achieve proficiency in critical combat skills. Numerous factors influence the requirement for this capability, including:

- (1) Environmental constraints on training.
- (2) Reduced range and exercise area.
- (3) Pressure to trim OPTEMPO and ammunition budgets.
- (4) The need to rehearse missions on the terrain and under the conditions that simulate the next deployment as closely as possible.



(5) The need for training to be versatile enough to change in response to the quickly changing individual and collective task performance requirements. The capability to provide highly realistic training through means other than on-the-job or field training is needed in numerous areas of individual and collective skills training including training for dismounted soldiers, maintenance training, training of equipment operation, battle staff and small group leader training. Trainers must be capable of easily reconfiguring advanced simulations to meet training/ mission rehearsal requirements of the immediate contingency. Capability to train/mission rehearse tasks realistically within advanced simulation also requires realistically-simulated friendly and opposing forces.

**q. Live, Virtual, and Constructive Simulation Technologies. (FOC AV 97-017) (Training)**

Description: Commanders require homestation and deployable training systems providing targetry, tactical engagement simulation and training analysis and feedback capabilities similar to those provided at the Army's CTCs. These advanced systems must interface with CTC instrumentation systems, virtual and constructive simulation systems, and ABCS systems. Tactical engagement simulation and future CTC instrumentation systems must leverage current capabilities provided by MILES, SAWE-RF, and MILES II; and incorporate current and future systems that must be represented in the live simulation environment (i.e., ET systems, electronic warfare systems, future weapons system, and future munitions).

**r. Synthetic Environment. (FOC AV 97-018) (Training)**

Description: Capability to develop, implement, and maintain tailorable synthetic environments. Training, at different levels (i.e. platoon through brigade), at different geographic locations, using different simulation systems, on an interactive basis, is recognized as beneficial. Future simulation systems, instrumentation systems, and ABCS platforms must be developed that operate (and interface) using common terrain, weather, and object databases, accurately represent atmospheric effects, and provide visual displays that are consistent with user requirements at all levels.

## Chapter 4 Implications

The following paragraphs provide the initial impact assessment generated by this concept. In accordance with TRADOC Pamphlet 71-9, Requirements Determinations, this broad non-detailed assessment is provided to focus the doctrine developer, training developer, leader developer, and combat developer to provide the detailed assessment which will stem from this effort.

**4-1. Doctrine.** Army aviation will continue the evolution of aviation command and control doctrine that describes the fundamental principles by which aviation forces guide their actions in support of obtaining objectives.

**4-2. Training.** Army aviation will provide aviation command and control training that incorporates automation as a functional portion of evolving training programs. Interactive student training devices will be necessary for academic training. In the school and in the units, networking capable team trainers are required for both initial and sustainment training. New modifications to aircraft simulators as well as aircraft systems, along with the required program of instruction hours, should also be resourced.

**4-3. Leadership.** Aviation leadership development should be expanded to prepare aviation leaders for the diverse challenges that a smaller more versatile force requires.

**4-4. Organization.** Army aviation may develop organizations that enhance aviation capabilities to support the patterns of operations. Aviation force structure will be tailorable in order to meet evolving tactical requirements. Additionally, aviation organizations will include appropriate maintenance and logistical support elements required to sustain the force.

**4-5. Materiel.**

a. Aircraft will have joint, combined, and multinational force interoperable communications (voice, data, and imagery) during all flight modes.

b. Aviation ground systems will be transportable and meet the mobility and deployability requirements of the organizations to which they are assigned.

- PROJECT THE FORCE	- PROTECT THE FORCE
- GAIN INFORMATION DOMINANCE	- SHAPE THE BATTLESPACE
- CONDUCT DECISIVE OPERATIONS	- SUSTAIN THE FORCE

**Figure 3-1. Future Patterns of Operations**

c. On-board communications will possess a low probability of intercept, provide a jam-resistant capability, and hardening against virtually any source of electronic countermeasures, and operate in both secure and non-secure modes.

d. Air vehicles will have extended range and non-line-of-sight communications which can provide for both voice and data transfer.

e. Army aviation command and control headquarters (brigade and battalion) will have the capability to communicate (voice, data, and imagery) with air defense, air traffic services (terminal and en route separation and airspace deconfliction), field artillery, Air Force, and Navy. Army aviation command and control headquarters will have the capability to communicate with other friendly forces over all types of terrain and through virtually any level of battlefield clutter and aural or electronic interference.

f. Army aviation will have the capability for direct interface with unmanned aerial vehicles, Joint Surveillance and Target Attack Radar System, or airborne command and control nodes, and exo-atmospheric or space-based systems. This capability will allow forward-ranging aviation units to "see" and communicate over the horizon and will provide targeting information through secure voice/data links.

g. Army aviation will develop materiel which emphasizes commonality in design and construction, is easily transportable both strategically and tactically, and incorporates open system design where new must integrate with the old.

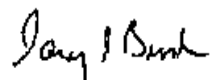
**4-6. Soldiers.** The changing picture of technology should be brought into focus for the soldier to acquire and master the skills necessary to win and survive on the battlefield of the future. Each of the requirements established under doctrine, training, leader development, organization, and materiel will interface with the individual and collective abilities of the soldiers to which these capabilities will be applied. Technology will capitalize on the inherent capabilities of soldiers who will use it while not exceeding their limitations. The format and content of the technology presented to the soldier will be intuitive and standardized to enhance decision-making skills.

## GLOSSARY

ATCCS	Army Tactical Command and Control System; Air Traffic Command and Control System
ABCS	Army Battle Command System
C2	command and control
CAS	close air support
CCIR	commander's critical information requirements
CONUS	continental United States
CTC	Combat Training Center
DTLOMS	doctrine, training, leader development, organizations, materiel, and soldier
ET	embedded training
FLOT	forward line of troops
FOC	Future Operational Capability
IMETP	International Military Education and Training Program
JTF	Joint Task Force
LCC	land component commander
LOC	lines of communication
METT-TC	mission, enemy, terrain, troops, time, and civilian considerations
NBC	nuclear, biological, chemical
OPTEMPO	operations tempo
SASO	Stability and Support Operations
TRADOC	United States Army Training and Doctrine Command

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